MATH 122: TEST 3 REVIEW

PROBLEMS FROM PAGES 157-158

Problem 1:

$$f(t) = 6\,t^4$$
$$f'(t) = ?$$

Problem 1:

$$f(t) = 6\,t^4$$
$$f'(t) = 6$$

Problem 1:

$$f(t) = 6\,t^4$$
$$f'(t) = 6\left(4t^{4-1}\right)$$

Problem 1:

$$f(t) = 6\,t^4$$
$$f'(t) = 6\left(4t^3\right)$$

Problem 1:

$$f(t) = 6\,t^4$$
$$f'(t) = 24\,t^3$$

Problem 6:

$$y = 5e^{-0.2t}$$
$$y' = ?$$

Problem 6:

$$y = 5e^{-0.2t}$$
$$y' = 5$$

Problem 6:

$$y = 5e^{-0.2t}$$
$$y' = 5\left(e^{-0.2t}\right)$$

Problem 6:

$$y = 5e^{-0.2t}$$
$$y' = 5\left(e^{-0.2t}(-0.2)\right)$$

Problem 6:

$$y = 5e^{-0.2t}$$
$$y' = 5\left(e^{-0.2t}(-0.2)\right)$$

Problem 6:

$$y = 5e^{-0.2t}$$
$$y' = -e^{-0.2t}$$

Problem 7:

$$s(t) = (t^2 + 4)(5t - 1)$$
$$s'(t) = ?$$

Problem 7:

$$s(t) = (t^2 + 4)(5t - 1)$$
$$s'(t) = 2t \cdot (5t - 1) + (t^2 + 4) \cdot 5$$

Problem 7:

$$s(t) = (t^2 + 4)(5t - 1)$$
$$s'(t) = 2t \cdot (5t - 1) + (t^2 + 4) \cdot 5$$

Problem 7:

$$\begin{aligned} s(t) &= (t^2+4)(5t-1) \\ s'(t) &= 2t\cdot(5t-1)+(t^2+4)\cdot 5 \\ &= ? \end{aligned}$$

Problem 7:

$$\begin{aligned} s(t) &= (t^2+4)(5t-1) \\ s'(t) &= 2t \cdot (5t-1) + (t^2+4) \cdot 5 \\ &= 15t^2 \end{aligned}$$

Problem 7:

$$
\begin{aligned}
s(t) &= (t^2+4)(5t-1) \\
s'(t) &= 2t\cdot(5t-1)+(t^2+4)\cdot 5 \\
&= 15t^2-2t
\end{aligned}
$$

Problem 7:

$$\begin{aligned} s(t) &= (t^2+4)(5t-1) \\ s'(t) &= 2t\cdot(5t-1)+(t^2+4)\cdot 5 \\ &= 15t^2-2t+20 \end{aligned}$$

Problem 7:

$$\begin{aligned} s(t) &= (t^2+4)(5t-1) \\ s'(t) &= 2t{\cdot}(5t{-}1){+}(t^2{+}4){\cdot}5 \\ &= 15t^2-2t+20 \end{aligned}$$

Problem 8:

$$g(t) = e^{(1+3t)^2}$$

$$g'(t) = ?$$

Problem 8:

$$g(t) = e^{\left((1+3t)^2\right)}$$

$$g'(t) = ?$$

Problem 8:

$$g(t) = e^{\left((1+3t)^2\right)}$$
$$g'(t) = e^{\left((1+3t)^2\right)}$$

Problem 8:

$$g(t) = e^{\left((1+3t)^2\right)}$$

$$g'(t) = e^{\left((1+3t)^2\right)} \cdot 2 \cdot (1+3t)$$

Problem 8:

$$g(t) = e^{\left((1+3t)^2\right)}$$

$$g'(t) = e^{\left((1+3t)^2\right)} \cdot 2 \cdot (1+3t) \cdot 3$$

Problem 8:

$$
\begin{aligned}
g(t) &= e^{\left((1+3t)^2\right)} \\
g'(t) &= e^{\left((1+3t)^2\right)} \cdot 2 \cdot (1+3t) \cdot 3 \\
&= 6(1+3t)e^{(1+3t)^2}
\end{aligned}
$$

Problem 13:

$$f(z) = \ln(z^2 + 1)$$

$$f'(z) = \,?$$

Problem 13:

$$f(z) = \ln(z^2 + 1)$$

$$f'(z) = \frac{1}{z^2 + 1}$$

Problem 13:

$$f(z) = \ln(z^2 + 1)$$

$$f'(z) = \frac{1}{z^2 + 1}$$

Problem 13:

$$f(z) = \ln(z^2 + 1)$$

$$f'(z) = \frac{2z}{z^2 + 1}$$

Problem 13:

$$f(z) = \ln(z^2 + 1)$$

$$f'(z) = \frac{2z}{z^2 + 1}$$

Problem 14:

$$y = xe^{3x}$$

$$y' = ?$$

Problem 14:

$$y = xe^{3x}$$

$$y' = 1 \cdot e^{3x} + x \cdot e^{3x} \cdot 3$$

Problem 14:

$$y = xe^{3x}$$

$$y' = 1 \cdot e^{3x} + x \cdot e^{3x} \cdot 3$$

Problem 14:

$$y = xe^{3x}$$
$$y' = e^{3x} + 3xe^{3x}$$

Problem 14:

$$\begin{aligned} y &= xe^{3x} \\ y' &= e^{3x} + 3xe^{3x} \\ &= e^{3x}(1 + 3x) \end{aligned}$$

Problem 14:

$$
\begin{aligned}
y &= xe^{3x} \\
y' &= e^{3x} + 3xe^{3x} \\
&= e^{3x}(1 + 3x) \\
&= (3x + 1)e^{3x}
\end{aligned}
$$

Problem 23:

$$g(x) = \frac{25x^2}{e^x}$$

$$g'(x) = ?$$

Problem 23:

$$g(x) = \frac{25x^2}{e^x}$$

$$g'(x) = \frac{\rule{8cm}{0pt}}{(e^x)^2}$$

Problem 23:

$$g(x) = \frac{25x^2}{e^x}$$

$$g'(x) = \frac{e^x \cdot 25 \cdot 2x}{(e^x)^2}$$

Problem 23:

$$g(x) = \frac{25x^2}{e^x}$$

$$g'(x) = \frac{e^x \cdot 25 \cdot 2x - }{(e^x)^2}$$

Problem 23:

$$g(x) = \frac{25x^2}{e^x}$$

$$g'(x) = \frac{e^x \cdot 25 \cdot 2x - 25x^2 \cdot e^x}{(e^x)^2}$$

Problem 23:

$$g(x) = \frac{25x^2}{e^x}$$

$$g'(x) = \frac{e^x \cdot 25 \cdot 2x - 25x^2 \cdot e^x}{(e^x)^2}$$

Problem 23:

$$g(x) = \frac{25x^2}{e^x}$$

$$g'(x) = \frac{e^x \cdot 25 \cdot 2x - 25x^2 \cdot e^x}{(e^x)^2}$$

$$= \frac{25 \cdot 2x - 25x^2}{e^x}$$

Problem 23:

$$g(x) = \frac{25x^2}{e^x}$$

$$g'(x) = \frac{e^x \cdot 25 \cdot 2x - 25x^2 \cdot e^x}{(e^x)^2}$$

$$= \frac{50x - 25x^2}{e^x}$$

Problem 23:

$$g(x) = \frac{25x^2}{e^x}$$

$$g'(x) = \frac{e^x \cdot 25 \cdot 2x - 25x^2 \cdot e^x}{(e^x)^2}$$

$$= \frac{25x(2-x)}{e^x}$$

Problem 23:

$$g(x) = \frac{25x^2}{e^x}$$

$$g'(x) = \frac{e^x \cdot 25 \cdot 2x - 25x^2 \cdot e^x}{(e^x)^2}$$

$$= -25x(x-2)e^{-x}$$

Problem 25:

$$f(x) = \ln(1 + e^x)$$

$$f'(x) = ?$$

Problem 25:

$$f(x) = \ln(1 + e^x)$$

$$f'(x) = \underline{\hspace{3cm}}$$

Problem 25:

$$f(x) = \ln(1 + e^x)$$

$$f'(x) = \frac{}{1 + e^x}$$

Problem 25:

$$f(x) = \ln(1 + e^x)$$

$$f'(x) = \frac{e^x}{1 + e^x}$$

Problem 27:

$$f(x) = (1 + e^x)^{10}$$

$$f'(x) = ?$$

Problem 27:

$$f(x) = (1 + e^x)^{10}$$

$$f'(x) = 10 \cdot (1 + e^x)^9 \cdot e^x$$

Problem 35:

$$z = \frac{t^2 + 5t + 2}{t + 3}$$

$$z' = ?$$

Problem 35:

$$z = \frac{t^2 + 5t + 2}{t + 3}$$

$$z' = \frac{\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad}{?}$$

Problem 35:

$$z = \frac{t^2 + 5t + 2}{t + 3}$$

$$z' = \frac{\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad}{(t+3)^2}$$

Problem 35:

$$z = \frac{t^2 + 5t + 2}{t + 3}$$

$$z' = \frac{(t+3) \cdot (2t+5) - (t^2 + 5t + 2) \cdot 1}{(t+3)^2}$$

Problem 35:

$$z = \frac{t^2 + 5t + 2}{t + 3}$$

$$z' = \frac{(t+3)\cdot(2t+5) - (t^2+5t+2)\cdot 1}{(t+3)^2}$$

Problem 35:

$$z = \frac{t^2 + 5t + 2}{t + 3}$$

$$z' = \frac{(t+3)\cdot(2t+5) - (t^2+5t+2)\cdot 1}{(t+3)^2}$$

Problem 35:

$$z = \frac{t^2 + 5t + 2}{t + 3}$$

$$z' = \frac{(t+3)\cdot(2t+5) - (t^2+5t+2)\cdot 1}{(t+3)^2}$$

Problem 35:

$$z = \frac{t^2 + 5t + 2}{t + 3}$$

$$z' = \frac{(t+3) \cdot (2t+5) - (t^2 + 5t + 2) \cdot 1}{(t+3)^2}$$

$$= \frac{}{(t+3)^2}$$

Problem 35:

$$z = \frac{t^2 + 5t + 2}{t + 3}$$

$$z' = \frac{(t + 3) \cdot (2t + 5) - (t^2 + 5t + 2) \cdot 1}{(t + 3)^2}$$

$$= \frac{t^2}{(t + 3)^2}$$

Problem 35:

$$z = \frac{t^2 + 5t + 2}{t + 3}$$

$$z' = \frac{(t + 3) \cdot (2t + 5) - (t^2 + 5t + 2) \cdot 1}{(t + 3)^2}$$

$$= \frac{t^2 + 6t}{(t + 3)^2}$$

Problem 35:

$$z = \frac{t^2 + 5t + 2}{t + 3}$$

$$z' = \frac{(t + 3) \cdot (2t + 5) - (t^2 + 5t + 2) \cdot 1}{(t + 3)^2}$$

$$= \frac{t^2 + 6t + 13}{(t + 3)^2}$$

Problem 37:

$$f(x) = 2x^3 - 5x^2 + 3x - 5$$

Find the equation of the tangent line at $x = 1$.

Problem 37:

$$f(x) = 2x^3 - 5x^2 + 3x - 5$$

Find the equation of the tangent line at $x = 1$.

$$f'(x) = 6x^2 - 10x + 3$$

Problem 37:

$$f(x) = 2x^3 - 5x^2 + 3x - 5$$

Find the equation of the tangent line at $x = 1$.

$$f'(x) = 6x^2 - 10x + 3$$

The slope at $x = 1$ is $f'(1) = -1$.

Problem 37:

$$f(x) = 2x^3 - 5x^2 + 3x - 5$$

Find the equation of the tangent line at $x = 1$.

$$f'(x) = 6x^2 - 10x + 3$$

The slope at $x = 1$ is $f'(1) = -1$.

$$y \; = -x + b$$

Problem 37:

$$f(x) = 2x^3 - 5x^2 + 3x - 5$$

Find the equation of the tangent line at $x = 1$.

$$f'(x) = 6x^2 - 10x + 3$$

The slope at $x = 1$ is $f'(1) = -1$.

$$-5 = -1 + b$$

Problem 37:

$$f(x) = 2x^3 - 5x^2 + 3x - 5$$

Find the equation of the tangent line at $x = 1$.

$$f'(x) = 6x^2 - 10x + 3$$

The slope at $x = 1$ is $f'(1) = -1$.

$$-5 = -1 + b$$

Problem 37:

$$f(x) = 2x^3 - 5x^2 + 3x - 5$$

Find the equation of the tangent line at $x = 1$.

$$f'(x) = 6x^2 - 10x + 3$$

The slope at $x = 1$ is $f'(1) = -1$.

$$b = -4$$

Problem 37:

$$f(x) = 2x^3 - 5x^2 + 3x - 5$$

Find the equation of the tangent line at $x = 1$.

$$f'(x) = 6x^2 - 10x + 3$$

The slope at $x = 1$ is $f'(1) = -1$.

$$y = -x - 4$$

Problem 42:

$$P(t) = 10e^{0.6t} \text{ fish where } t \text{ is in months}$$

$$P(12) = ? \qquad P'(12) = ?$$

Problem 42:

$$P(t) = 10e^{0.6t} \text{ fish where } t \text{ is in months}$$

$$P(12) = ? \qquad P'(12) = ?$$

$$P(12) = 10e^{0.6 \cdot 12}$$

Problem 42:

$$P(t) = 10e^{0.6t} \text{ fish where } t \text{ is in months}$$

$$P(12) = ? \qquad P'(12) = ?$$

$$P(12) = 10e^{0.6\cdot 12} = 10e^{7.2}$$

Problem 42:

$$P(t) = 10e^{0.6t} \text{ fish where } t \text{ is in months}$$

$$P(12) = ? \qquad P'(12) = ?$$

$$P(12) = 10e^{0.6 \cdot 12} = 10e^{7.2} = 13394.3$$

Problem 42:

$$P(t) = 10e^{0.6t} \text{ fish where } t \text{ is in months}$$

$$P(12) = ? \qquad P'(12) = ?$$

$$P(12) = 10e^{0.6 \cdot 12} = 10e^{7.2} = 13394.3$$

In one year, there will be 13394.3 fish.

Problem 42:

$$P(t) = 10e^{0.6t} \text{ fish where } t \text{ is in months}$$

$$P(12) = ? \qquad P'(12) = ?$$

$$P(12) = 10e^{0.6 \cdot 12} = 10e^{7.2} = 13394.3$$

In one year, there will be ≈ 13394 fish.

Problem 42:

$$P(t) = 10e^{0.6t} \text{ fish where } t \text{ is in months}$$

$$P(12) = ? \qquad P'(12) = ?$$

$$P'(t) = 10e^{0.6t} \cdot 0.6$$

Problem 42:

$$P(t) = 10e^{0.6t} \text{ fish where } t \text{ is in months}$$

$$P(12) = ? \qquad P'(12) = ?$$

$$P'(t) = 10e^{0.6t} \cdot 0.6 \qquad P'(12) = P(12) \cdot 0.6$$

Problem 42:

$$P(t) = 10e^{0.6t} \text{ fish where } t \text{ is in months}$$

$$P(12) = ? \qquad P'(12) = ?$$

$$P'(t) = 10e^{0.6t} \cdot 0.6 \qquad P'(12) = 13394 \cdot 0.6$$

Problem 42:

$$P(t) = 10e^{0.6t} \text{ fish where } t \text{ is in months}$$

$$P(12) = ? \qquad P'(12) = ?$$

$$P'(t) = 10e^{0.6t} \cdot 0.6 \qquad P'(12) = 8036$$

Problem 42:

$$P(t) = 10e^{0.6t} \text{ fish where } t \text{ is in months}$$

$$P(12) = ? \qquad P'(12) = ?$$

$$P'(t) = 10e^{0.6t} \cdot 0.6 \qquad P'(12) = 8036$$

In the first month after the first year, the fish population will increase by approximately $\mathbf{8036}$ fish.

Problem 42:

$$P(t) = 10e^{0.6t} \text{ fish where } t \text{ is in months}$$

$$P(12) = ? \qquad P'(12) = ?$$

$$P'(t) = 10e^{0.6t} \cdot 0.6 \qquad P'(12) = 8037$$

In the first month after the first year, the fish population will increase by approximately $\mathbf{8037}$ fish.

Problem 42:

$P(t) = 10e^{0.6t}$ fish where t is in months

$$P(12) = 13394 \qquad P'(12) = 8037$$

What are the units?

Problem 42:

$P(t) = 10e^{0.6t}$ fish where t is in months

$P(12) = 13394$ $\qquad$ $P'(12) = 8037$

fish $\qquad$ fish/month

Problem 44:

$$f(t) = 100te^{-0.5t} \text{ mg where } t \text{ is in hours}$$

Compute $f(1)$, $f'(1)$, $f(5)$, and $f'(5)$.

Problem 44:

$$f(t) = 100te^{-0.5t}$$ mg where t is in hours

Compute $f(1)$, $f'(1)$, $f(5)$, and $f'(5)$.

$$f(1) = 100e^{-0.5} = 60.653\ldots$$

Problem 44:

$$f(t) = 100te^{-0.5t} \text{ mg where } t \text{ is in hours}$$

Compute $f(1), f'(1), f(5),$ and $f'(5)$.

$$f(1) = 100e^{-0.5} = 60.653... \text{ mg}$$

Problem 44:

$$f(t) = 100te^{-0.5t} \text{ mg where } t \text{ is in hours}$$

Compute $f(1), f'(1), f(5),$ and $f'(5)$.

$$f(1) = 100e^{-0.5} = 60.653... \text{ mg}$$

One hour after the injection of the drug, about 61 milligrams of the drug are in the body.

Problem 44:

$$f(t) = 100te^{-0.5t} \text{ mg where } t \text{ is in hours}$$

Compute $f(1), f'(1), f(5),$ and $f'(5)$.

$$f(5) = 500e^{-2.5} = 41.04\ldots \text{ mg}$$

Five hours after the injection of the drug, about 41 milligrams of the drug are in the body.

Problem 44:

$f(t) = 100te^{-0.5t}$ mg where t is in hours

Compute $f(1)$, $f'(1)$, $f(5)$, and $f'(5)$.

$f'(t) =$

Problem 44:

$$f(t) = 100te^{-0.5t} \text{ mg where } t \text{ is in hours}$$

Compute $f(1)$, $f'(1)$, $f(5)$, and $f'(5)$.

$$f'(t) = 100 \cdot \Bigg(\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \Bigg)$$

Problem 44:

$$f(t) = 100te^{-0.5t} \text{ mg where } t \text{ is in hours}$$

Compute $f(1), f'(1), f(5),$ and $f'(5).$

$$f'(t) = 100 \cdot \left(1 \cdot e^{-0.5t} + t \cdot e^{-0.5t} \cdot (-0.5)\right)$$

Problem 44:

$$f(t) = 100te^{-0.5t} \text{ mg where } t \text{ is in hours}$$

Compute $f(1), f'(1), f(5),$ and $f'(5)$.

$$f'(t) = 100 \cdot \left(1 \cdot e^{-0.5t} + t \cdot e^{-0.5t} \cdot (-0.5)\right)$$
$$= 100\left(1 - 0.5t\right)e^{-0.5t}$$

Problem 44:

$f(t) = 100te^{-0.5t}$ mg where t is in hours

Compute $f(1)$, $f'(1)$, $f(5)$, and $f'(5)$.

$$f'(t) = 100\big(1 - 0.5t\big)e^{-0.5t}$$

Problem 44:

$$f(t) = 100te^{-0.5t} \text{ mg where } t \text{ is in hours}$$

Compute $f(1), f'(1), f(5),$ and $f'(5)$.

$$f'(t) = 100\left(1 - 0.5t\right)e^{-0.5t}$$

$$f'(1) = 50e^{-0.5} \approx 30.33 \text{ mg/hour}$$

Problem 44:

$f(t) = 100te^{-0.5t}$ mg where t is in hours

Compute $f(1)$, $f'(1)$, $f(5)$, and $f'(5)$.

$$f'(t) = 100\big(1 - 0.5t\big)e^{-0.5t}$$

$$f'(1) = 50e^{-0.5} \approx 30.33 \text{ mg/hour}$$

After one hour, the drug is entering the body at a rate of 30 milligrams per hour.

Problem 44:

$f(t) = 100te^{-0.5t}$ mg where t is in hours

Compute $f(1)$, $f'(1)$, $f(5)$, and $f'(5)$.

$$f'(t) = 100\left(1 - 0.5t\right)e^{-0.5t}$$

$f'(5) = -150e^{-2.5} \approx -12.31$ mg/hour

After five hours, the drug is leaving the body at a rate of 12 milligrams per hour.

Problem 45:

$$r(2) = 4, \quad s(2) = 1, \quad s(4) = 2,$$
$$r'(2) = -1, \quad s'(2) = 3, \quad s'(4) = 3$$

Problem 45:

$$\boldsymbol{r(2) = 4, \quad s(2) = 1, \quad s(4) = 2,}$$
$$\boldsymbol{r'(2) = -1, \quad s'(2) = 3, \quad s'(4) = 3}$$

(a) $\boldsymbol{H'(2) =}$ $\square$ where $\boldsymbol{H(x) = r(x) + s(x)}$

Problem 45:

$$r(2) = 4, \quad s(2) = 1, \quad s(4) = 2,$$
$$r'(2) = -1, \quad s'(2) = 3, \quad s'(4) = 3$$

(a) $H'(2) = \square$ where $H(x) = r(x) + s(x)$

$$H'(x) = r'(x) + s'(x)$$

Problem 45:

$$r(2) = 4, \quad s(2) = 1, \quad s(4) = 2,$$
$$r'(2) = -1, \quad s'(2) = 3, \quad s'(4) = 3$$

(a) $H'(2) = \square$ where $H(x) = r(x) + s(x)$

$$H'(x) = r'(x) + s'(x)$$
$$H'(2) = r'(2) + s'(2)$$

Problem 45:

$$r(2) = 4, \quad s(2) = 1, \quad s(4) = 2,$$
$$r'(2) = -1, \quad s'(2) = 3, \quad s'(4) = 3$$

(a) $H'(2) = \square$ where $H(x) = r(x) + s(x)$

$$\begin{aligned} H'(x) &= r'(x) + s'(x) \\ H'(2) &= r'(2) + s'(2) \\ &= -1 + 3 \end{aligned}$$

Problem 45:

$$r(2) = 4, \quad s(2) = 1, \quad s(4) = 2,$$
$$r'(2) = -1, \quad s'(2) = 3, \quad s'(4) = 3$$

(a) $H'(2) = \square$ where $H(x) = r(x) + s(x)$

$$\begin{aligned} H'(x) &= r'(x) + s'(x) \\ H'(2) &= r'(2) + s'(2) \\ &= -1 + 3 = 2 \end{aligned}$$

Problem 45:

$$r(2) = 4, \quad s(2) = 1, \quad s(4) = 2,$$
$$r'(2) = -1, \quad s'(2) = 3, \quad s'(4) = 3$$

(a) $H'(2) = \boxed{2}$ where $H(x) = r(x) + s(x)$

$$\begin{aligned} H'(x) &= r'(x) + s'(x) \\ H'(2) &= r'(2) + s'(2) \\ &= -1 + 3 = 2 \end{aligned}$$

Problem 45:

$$r(2) = 4, \quad s(2) = 1, \quad s(4) = 2,$$
$$r'(2) = -1, \quad s'(2) = 3, \quad s'(4) = 3$$

(b) $H'(2) = \boxed{}$ where $H(x) = 5s(x)$

Problem 45:

$$r(2) = 4, \quad s(2) = 1, \quad s(4) = 2,$$
$$r'(2) = -1, \quad s'(2) = 3, \quad s'(4) = 3$$

(b) $H'(2) = \boxed{}$ where $H(x) = 5s(x)$

$$H'(x) = 5s'(x)$$

Problem 45:

$$r(2) = 4, \quad s(2) = 1, \quad s(4) = 2,$$
$$r'(2) = -1, \quad s'(2) = 3, \quad s'(4) = 3$$

(b) $H'(2) = \boxed{}$ where $H(x) = 5s(x)$

$$H'(x) = 5s'(x)$$
$$H'(2) = 5s'(2)$$

Problem 45:

$$r(2) = 4, \quad s(2) = 1, \quad s(4) = 2,$$
$$r'(2) = -1, \quad s'(2) = 3, \quad s'(4) = 3$$

(b) $H'(2) = \boxed{}$ where $H(x) = 5s(x)$

$$\begin{aligned} H'(x) &= 5s'(x) \\ H'(2) &= 5s'(2) \\ &= 5 \cdot 3 = 15 \end{aligned}$$

Problem 45:

$$r(2) = 4, \quad s(2) = 1, \quad s(4) = 2,$$
$$r'(2) = -1, \quad s'(2) = 3, \quad s'(4) = 3$$

(b) $H'(2) = \boxed{15}$ where $H(x) = 5s(x)$

$$\begin{aligned} H'(x) &= 5s'(x) \\ H'(2) &= 5s'(2) \\ &= 5 \cdot 3 = 15 \end{aligned}$$

Problem 45:

$$r(2) = 4, \quad s(2) = 1, \quad s(4) = 2,$$
$$r'(2) = -1, \quad s'(2) = 3, \quad s'(4) = 3$$

(c) $H'(2) = \boxed{}$ where $H(x) = r(x) \cdot s(x)$

Problem 45:

$$r(2) = 4, \quad s(2) = 1, \quad s(4) = 2,$$
$$r'(2) = -1, \quad s'(2) = 3, \quad s'(4) = 3$$

(c) $H'(2) = \boxed{}$ where $H(x) = r(x) \cdot s(x)$

$$H'(x) = r'(x)s(x) + r(x)s'(x)$$

Problem 45:

$$r(2) = 4, \quad s(2) = 1, \quad s(4) = 2,$$
$$r'(2) = -1, \quad s'(2) = 3, \quad s'(4) = 3$$

(c) $H'(2) = \boxed{}$ where $H(x) = r(x) \cdot s(x)$

$$H'(x) = r'(x)s(x) + r(x)s'(x)$$
$$H'(2) = r'(2)s(2) + r(2)s'(2)$$

Problem 45:

$$r(2) = 4, \quad s(2) = 1, \quad s(4) = 2,$$
$$r'(2) = -1, \quad s'(2) = 3, \quad s'(4) = 3$$

(c) $H'(2) = \boxed{}$ where $H(x) = r(x) \cdot s(x)$

$$H'(x) = r'(x)s(x) + r(x)s'(x)$$
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Problem 49:

$$f(x) = x^4 - 4x^3$$

Where am I both decreasing and concave up?

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$x < 0$ and $2 < x < 3$

PROBLEMS FROM PAGE 213

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Find f' and f''.

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$$f(x) = 2x^3 - 9x^2 + 12x + 1 \quad (-0.5 \leq x \leq 3)$$

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