

4.2 #2 Simplify the following

2pts

(a) $(\frac{1}{e})^{-2} = \frac{1^{-2}}{e^{-2}} = \frac{1^2}{1/e^2} = \frac{e^2}{1} \cdot \frac{1}{1} = \boxed{e^2}$
 (b) $(\frac{e^5}{e^2})^{-1} = (e^{5-2})^{-1} = (e^3)^{-1} = e^{-3} = \boxed{\frac{1}{e^3}}$
 (c) $(\frac{e^5}{e^3}) = e^{5-3} = \boxed{e^2}$
 (d) $\frac{1}{e^{-3}} = \frac{1}{1/e^3} = \boxed{e^3}$

2pts

Compound Interest In Exercises 35-38, complete the table to determine the amount of money P that should be invested at rate r to produce a final balance of \$100,000 in t years.

$A = Pe^{rt} \rightarrow 100,000 = Pe^{rt}$
 when $A = 100,000$ $P = \frac{100,000}{e^{rt}}$
 $r = .03$
 $t = \text{given}$
 $P = \frac{100,000}{e^{.03t}}$

t	1	10	20	30	40	50
P						

35. $r = 4\%$, compounded continuously
 36. $r = 3\%$, compounded continuously

t	1	10	20	30	40	50
P	\$97044.55	74081.82	54881.16	40656.97	30119.42	22313.02

3pts

4.3 #22 Find the line tangent to $y = (e^{4x} - 2)^2$ through $(0, 1)$.

$y' = 2(e^{4x} - 2)(e^{4x}) \cdot 4 = 8e^{4x}(e^{4x} - 2)$ at $x=0$ $y' = -8 = \text{slope}$.

Pt. Slope $y - y_1 = m(x - x_1) \rightarrow y - 1 = -8(x - 0) \rightarrow y - 1 = -8x$ $\boxed{y = -8x + 1}$

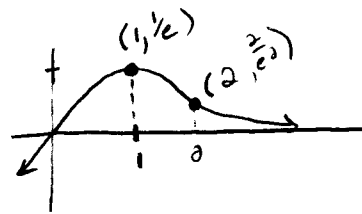
3pts

4.3 #34 Graph and analyze $f(x) = xe^{-x}$. Find extrema & points of inflection.

$f(x) = xe^{-x}$
 $f'(x) = xe^{-x}(-1) + e^{-x}$
 $f'(x) = e^{-x}(1-x)$
 $f'(x) = 0$ at $x=1$
 $\xrightarrow{\quad}$
 pos | 1 | neg
 rel. max at $x=1$

$f''(x) = e^{-x}(-1) + (1-x)e^{-x}(-1)$
 $f''(x) = -e^{-x} - (1-x)e^{-x}$
 $= e^{-x}(-1 - (1-x))$
 $f''(x) = e^{-x}(x-2)$
 $f''(x) = 0$ at $x=2$
 $\xleftarrow{\quad}$
 neg | 2 | pos
 f''

Concave down on $(0, 2)$
 Concave up on $(2, \infty)$



max $\rightarrow (1, 1/e)$
 inflect on $(2, 2/e^2)$