3-0235 — 50 SHEETS — 5 SQUARES
3-0236 — 100 SHEETS — 5 SQUARES
3-0237 — 200 SHEETS — 5 SQUARES
3-0137 — 200 SHEETS — FILLER
COMET

1) $f(x) = x^4 + 3x^2 \quad a = -1$

$f'(x) = 4x^3 + 3x$

$L(x) = f(-1) + f'(-1)(x - (-1))$

$= 4 + -10(x+1)$

$\boxed{L(x) = -10x - 6}$

2) $f(x) = \ln x \quad a = 1$

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

$L(x) = f(1) + f'(1)(x-1)$

$= 0 + 1(x-1)$

$\boxed{L(x) = x - 1}$

5) $f(x) = \sqrt{1-x} \quad a = 0$

$f'(x) = \frac{-1}{2\sqrt{1-x}}$

$L(x) = f(0) + f'(0)(x-0)$

$L(x) = 1 - \frac{1}{2}x$

$\sqrt{.9} \approx L(.1) = 1 - \frac{.1}{2}$

$= .95$

$\sqrt{.99} \approx L(.01) = 1 - \frac{.01}{2}$

$= .995$

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COMET

10) $f(x) = e^x \quad a = 0$

$f'(x) = e^x$

$L(x) = f(0) + f'(0)(x-0)$

$= 1 + 1(x)$

$L(x) = 1 + x$

$\therefore e^x \approx 1 + x$ at $a = 0$

Graph $e^x + .1$, $e^x - .1$ and $1 + x$

$0.479 \lesssim x \lesssim 1.412$

23) Estimate $(2.001)^5$

$f(x) = x^5$ at $a = 2$

$f'(x) = 5x^4$

$L(x) = f(2) + f'(2)(x-2)$

$= 32 + 80(x-2)$

$= 80x - 128$

$x^5 \approx 80(2.001) - 128$

$= 160.08 - 128$

$\boxed{x^5 \approx 32.08}$

26) $f(x) = \frac{1}{x}$ at $a = 1000$

$f'(x) = -\frac{1}{x^2}$

$L(x) = f(1000) + f'(1000)(x - 1000)$

$= .001 + .000001(x - 1000)$

$\frac{1}{1002} \approx L(1002) = .001 + .000001(1002 - 1000)$

$\boxed{= .000998}$

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3-0237 — 200 SHEETS — 5 SQUARES
3-0137 — 200 SHEETS — FILLER
COMET

43) a. From the given information and graph

$f(1) = 5$ and $f'(1) = 2$

$L(x) = f(1) + f'(1)(x-1)$

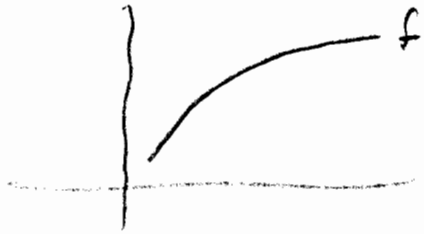
$= 5 + 2(x-1)$

$L(x) = 2x + 3$

$$\boxed{f(.9) \approx L(.9) = 2\cdot(.9)+3 = 4.8}$$

$$\boxed{f(1.1) \approx L(1.1) = 2(1.1)+3 = 5.2}$$

b. Expect estimates to be too large because the graph of $f'(x)$ is positive and decreasing. Thus the slope of f is positive but decreasing, hence a convex curve.



$f(x)$: slope is positive but getting less steep.

$L(x)$ is a tangent line to f, Any tangent will lie above f.