Math 473 Quiz 1 Spring 2007 Name_____

YOU ARE BEING GRADED FOR WORK

1) Suppose $F(t) = 1 - \exp(-\theta\, t^{\gamma})$ where $\theta > 0$, $\gamma > 0$ and $t > 0$. and $t > 0$. Find the following quantities for $t > 0$.

a) $S(t)$ $= 1 - F(t) = \exp(-\theta t^{\gamma})$

b) $f(t) = \frac{d}{dt} F(t) = -\exp(-\theta t^{\gamma})[-\theta\gamma t^{\gamma-1}] =$

$\theta\gamma t^{\gamma-1} \exp(-\theta t^{\gamma})$

c) $h(t)$ $= \frac{f(t)}{S(t)} = \theta\gamma t^{\gamma-1}$ $= \frac{d}{dt} H(t)$

d) $H(t)$ $= -G(t) = \theta t^{\gamma}$ if $S(t) = \exp(G(t))$

$= \exp(-H(t))$

$= -\log(S(t))$

Simplify or −3

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2) Suppose $S(t) = \exp[-\alpha t - \gamma(e^{\theta t} - 1)]$ for $t > 0$ where $\alpha > 0$, $\gamma > 0$, and $\theta > 0$. Find the following for $t > 0$.

a) Find $H(t)$. $= -G(t) = \alpha t + \gamma(e^{\theta t} - 1)$ $= -\log(S(t))$

if $S(t) = \exp(G(t))$

Simplify or −2

b) Find $h(t)$. $= H'(t) = \alpha + \gamma\theta e^{\theta t}$

c) Find $F(t)$. $= 1 - S(t) = 1 - \exp[-\alpha t - \gamma(e^{\theta t} - 1)]$

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Gompertz-Makeham

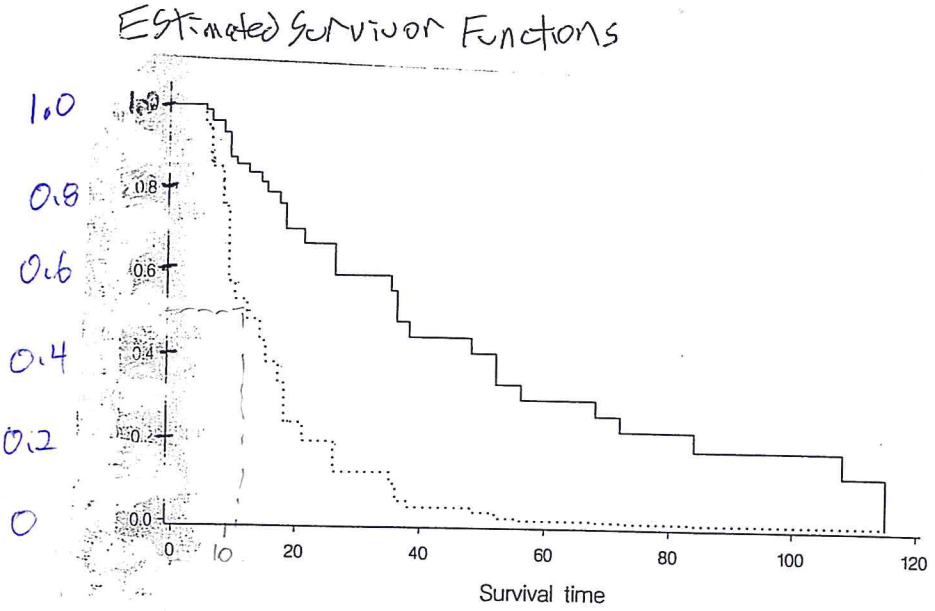
3) The survival functions plotted below are for 36 patients with a malignant tumor of the kidney, or hypernephroma. Patients with the solid darker line had a nephrectomy (surgical removal of the kidney) while patients with the lighter dashed line did not.

12 a) For the patients who did not receive a nephrectomy, estimate when 50% of these have died. Show the over and down lines. ≈12 (10–16)

11 b) Which treatment (nephrectomy or no nephrectomy) seems to be better? Explain briefly.

Nephrectomy ≈16; its survival curve is higher

of -1



Estimated survivor functions for patients aged less than 60, with (—) without (···) a nephrectomy.

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